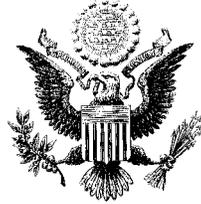


FISCAL POLICY CHOICES: EXAMINING THE EMPIRICAL EVIDENCE



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Executive Summary

Prior to the events of September 11, 2001, the U.S. government expected to run large recurring budget surpluses during this decade. The aftermath of the terror attacks has substantially changed the fiscal outlook. In this new economic and security environment, a bipartisan consensus has emerged that reducing federal net debt as rapidly as possible is not the exclusive objective of fiscal policy. Instead, both the Bush administration and Congress agree that additional tax reductions are needed to stimulate economic growth.

This study evaluates the economic trade-offs between federal tax relief and a more rapid reduction of federal net debt. This study employs the concept of opportunity cost (*i.e.*, the highest valued alternative that must be sacrificed when choosing one option over others) to evaluate the federal debt reduction and federal tax relief options in terms of their expected effects on real GDP growth.

Empirical studies consistently find that additional federal tax reductions, particularly of marginal federal income tax rates, would accrue large macroeconomic benefits. The marginal excess burden from federal taxation is about 40 percent. Reducing such deadweight losses through additional federal tax relief would enhance overall economic welfare and stimulate long-term real GDP growth. On the other hand, empirical studies do not indicate that a more rapid reduction of federal net debt would necessarily yield commensurate benefits. Under current circumstances and given the range of feasible fiscal policy options, the provision of federal tax relief is an appropriate objective for fiscal policy.

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FISCAL POLICY CHOICES: EXAMINING THE EMPIRICAL EVIDENCE

I. Introduction

In August 2001, the Congressional Budget Office (CBO) and the Office of Management and Budget (OMB) issued separate budget forecasts for the fiscal years 2002-2011 that reached remarkably similar conclusions. After factoring in the budgetary effects of the *Economic Growth and Tax Relief Reconciliation Act* (EGTRA) and the current economic slowdown that began in July 2000, both CBO and OMB forecast cumulative federal budget surpluses of \$3.397 trillion and \$3.113 trillion, respectively, for fiscal years 2002-2011.¹ Based on current policy, the CBO projected that federal net debt will decline to \$876 billion or 5.2 percent of GDP, while the U.S. Department of the Treasury will accumulate an unspent cash balance of \$820 billion or 4.8 percent of GDP, leaving a federal net indebtedness (federal net debt less the unspent cash balance) of a mere \$56 billion or 0.3 percent of GDP.² Similarly, based on the President's policy proposals, which include making all of the expiring tax provisions permanent, the OMB projected that federal net debt will fall to \$1.057 trillion or 6.1 percent of GDP, while the U.S. Department of the Treasury will accumulate an unspent cash balance of \$710 billion or 4.1 percent of GDP, leaving a federal net indebtedness of \$348 billion or 2.0 percent of GDP.³

The aftermath of September 11, 2001, has substantially changed the fiscal outlook. With bipartisan congressional support, President George W. Bush has launched a war on terrorism that will increase defense outlays beyond above previous CBO and OMB projections. The federal government will make substantial one-time outlays for disaster relief and recovery assistance in

FEDERAL FISCAL POSITION, FEDERAL BUDGET BALANCE, AND FEDERAL NET DEBT

The federal fiscal position refers to both federal budget balance and the amount of federal net debt. The federal budget balance is the difference between all federal revenues less all federal outlays in a unified federal budget during a fiscal year. The federal budget balance may be positive (a surplus) or negative (a deficit). Federal net debt represents the accumulation of all federal budget balances (surpluses and deficits) in past fiscal years.

Federal debt refers to the federal net debt, which is held by the public, rather than the federal gross debt, which includes both federal debt held by the public and federal debt held in intragovernmental accounts. Economists consider net debt as the proper measure of federal debt. Increasing (decreasing) net represents a withdrawal of money from (release of money to) global financial markets and may affect the broader economy. Publicly held U.S. Treasury debt securities (Treasuries) represent legally binding commitments with other parties that cannot be abrogated. In contrast, the U.S. government is both the creditor and debtor for Treasuries held in intragovernmental accounts. As President Bill Clinton stated in his *Fiscal Year 2000 Budget*, "These balances [in intragovernmental accounts] are available ... but only in a bookkeeping sense." Thus, an increase or a decrease of Treasuries in intragovernmental accounts is merely a bookkeeping entry that does not affect financial markets or the broader economy.

¹ Congressional Budget Office, *The Budget and Economic Outlook: An Update*, 107th Congress, 1st Session, August 2001: 1; and Executive Office of the President, Office of Management and Budget, *Budget of the United States, Fiscal Year 2002, Mid-Session Review* (Washington, D.C.: Government Printing Office, August 2001): 8.

² CBO, *The Budget and Economic Outlook: An Update*: 19, 55. Author calculated CBO projection of federal net indebtedness as a percent of GDP from CBO projections of federal net indebtedness and GDP.

³ OMB, *Mid-Session Review*: 20, 44. Author calculated OMB projection of federal net debt and net indebtedness as percents of GDP from OMB projections of federal net debt, net indebtedness, and GDP.

fiscal year 2002. In this new economic and security environment, a bipartisan consensus has emerged that reducing federal net debt as rapidly as possible is not the exclusive objective of fiscal policy. Instead, both the Bush administration and Congress agree that additional tax reductions are needed to stimulate economic growth.

This study evaluates the economic consequences of reducing federal net debt as rapidly as possible or providing additional federal tax reductions while reducing federal net debt moderately. This study employs the concept of opportunity cost (*i.e.*, the highest valued alternative that must be sacrificed when choosing one option over others) to evaluate the federal debt reduction and federal tax relief options in terms of their expected effects on real GDP growth.

II. What is Opportunity Cost?

Economics is fundamentally about making choices. For example, a consumer with \$16,000 to spend may buy either a 2002 economy car or 500 shares of General Electric stock. Since the consumer may use this \$16,000 only once, he or she must choose between the car and the GE stock. Both cannot be bought simultaneously. If the consumer purchases the car, then he or she has lost the opportunity to purchase the GE stock. Economists describe the highest valued alternative that must be sacrificed when choosing one option over others as the opportunity cost of such choice. In this example, the value of the GE stock would be the opportunity cost of buying the car.

The opportunity cost concept applies to the U.S. government as well. Suppose the U.S. government ends its fiscal year with a surplus of \$150 billion. During the next fiscal year, Congress may choose to reduce federal taxes by \$150 billion or reduce federal net debt by \$150 billion. Whatever its choice, Congress can use this \$150 billion dollar surplus only once. If Congress were to choose to reduce federal net debt, the United States would have to forego the macroeconomic benefits from additional federal tax reductions.

III. How Does the Federal Fiscal Position Affect Real GDP Growth?

What are the macroeconomic benefits from reducing federal net debt? Answering this question requires an understanding of how the budget balance of the U.S. government affects the American economy. Economists have postulated two competing models to describe the relationship between the federal fiscal position and economic performance: the conventional model and the Ricardian equivalence model.

A. Conventional Model

One view of how the federal budget balance affects the U.S. economy is known as the conventional model. The conventional model is based upon the macroeconomic savings and investment identity; *i.e.*, a country's aggregate savings must equal all of its uses both at home and abroad. In other words, the sum of private savings and government savings must equal the sum of domestic investment and net international investment (outward international investment by U.S. individuals and firms abroad less inward international investment by foreign individuals and firms in the United States).

Suppose the U.S. government expects that its budget will be exactly balanced in the next fiscal year. If U.S. policymakers decide to reduce federal taxes by \$150 billion temporarily

while leaving federal spending unchanged, the U.S. government would then incur a \$150 billion budget deficit in the next fiscal year. The U.S. Department of the Treasury would then borrow \$150 billion from global financial markets, adding \$150 billion to the federal net debt.

The \$150 billion federal budget deficit would increase the disposable income of U.S. taxpayers by \$150 billion. According to the conventional model, taxpayers would spend at least a portion of their tax reduction, boosting consumption expenditures within the United States. However, the resulting \$150 billion federal budget deficit would simultaneously reduce government savings. Given the macroeconomic savings and investment identity, one or more of the following must happen to restore equilibrium: (1) private savings may rise, (2) domestic investment may decline, or (3) net international investment may decline.

The conventional model asserts that real interest rates must rise sufficiently to reduce domestic investment and net international investment to restore equilibrium. However, higher real interest rates lower long-term real GDP growth by slowing the accumulation of capital. Under the conventional model, ameliorating the federal budget balance and reducing federal net debt should promote long-term real GDP growth by lowering real interest rates and thereby stimulating domestic investment and net international investment.⁴

B. Ricardian Equivalence Model

The 19th century economist David Ricardo postulated an alternative to the conventional model under which a government's fiscal position does not have significant macroeconomic effects.⁵ Robert J. Barro rediscovered Ricardo's idea in his 1974 article, "Are Government Bonds Net Worth?"⁶ Nobel Laureate James Buchanan christened the idea the Ricardian equivalence model in his comments on Barro's article.⁷

Under the conventional model, a federal tax reduction without a similar federal spending reduction will stimulate consumption expenditures, increase real interest rates, decrease domestic investment and net foreign investment, lower capital accumulation, and decelerate long-term GDP growth. In contrast, the Ricardian equivalence model asserts such a fiscal policy change will not cause any of these macroeconomic consequences. In other words, U.S. macroeconomic outcomes will be equivalent whether a deficit-financed federal tax reduction occurs or not.

The Ricardian equivalence model is based upon two economic insights – the government budget constraint and the permanent income hypothesis. First, in the absence of any change in federal spending, the government budget constraint implies that a federal tax reduction and the resulting budget deficit today will cause higher federal taxes in the future. Issuing net debt under these circumstances merely defers, but does not eliminate, the incidence of federal taxation.

Second, the permanent income hypothesis affirms that individuals base their consumption expenditures upon their expectations for disposable income over their entire lifetime, not just

⁴ Douglas W. Elmendorf and N. Gregory Mankiw, "Government Debt," in *Handbook of Macroeconomics*, ed. John B. Taylor and Michael Woodford, 1C (Amsterdam: Elsevier, 1999): 1627-1640.

⁵ Elmendorf and Mankiw note that David Ricardo did not necessarily advocate the Ricardian equivalence model. Elmendorf and Mankiw (1999): 1642-1643.

⁶ Robert J. Barro, "Are Government Bonds Net Worth?" *Journal of Political Economy* 82 (November-December 1974): 1095-1117.

⁷ James M. Buchanan, "Barro on the Ricardian Equivalence Theorem," *Journal of Political Economy* 84 (April 1976): 337-342.

upon their disposable income in the current week, month, or year. In other words, an individual's current consumption expenditures are a function of the present value of his or her expected disposable income during his or her lifetime. For example, a third-year law school student courted by several prestigious law firms may buy new suits or a motor vehicle on credit even though his or her current disposable income may still be very low. On the other hand, high income earners in their fifties may save large portions of their disposable income in anticipation of retirement. Thus, individuals smooth their consumption expenditures over their lifetime based on their expectations for permanent disposable income. Under the permanent income hypothesis, if individuals perceive that a federal tax reduction is temporary, they will save their tax benefits in order to pay higher taxes in the future since the present value of their expected future disposable income has not changed.

Combining the government budget constraint and the permanent income hypothesis, the Ricardian equivalence model holds that a deficit-financed tax revenue reduction may alter the timing of taxation, but does not change the present value of its burden. A deficit-financed tax revenue reduction cannot increase the public's expectations for permanent disposable income and therefore cannot alter consumption expenditures. An increase in private savings will offset the decrease in government savings, leaving macroeconomic outcomes unaltered. Real interest rates will not increase. The growth rates for investment and real GDP will remain unchanged.⁸

C. How to Evaluate the Validity of Both Models

At first glance, the conventional model may have a stronger intuitive appeal than the Ricardian equivalence model. However, intuitive appeal does not determine the validity of competing economic models. To determine their worth, economists perform empirical studies that compare the outcomes predicted by both models with real world data. The one that best fits the data is the more valid model.

The conventional model provides economists with two hypotheses that can be empirically tested:

1. Federal budget balance is negatively correlated with consumption expenditures.
2. Federal budget balance is negatively correlated with real interest rates.

If a sufficient number of econometric studies using different data sets consistently show statistically significant negative correlations both between the federal budget balance and consumption expenditures and between the federal budget balance and real interest rates, then the conventional model is valid, and the Ricardian equivalence model can be rejected. Otherwise, the conventional model is invalid, and the Ricardian equivalence model cannot be rejected.

D. Empirical Evidence

Challenging the conventional model, Robert J. Barro (1974) found that government debt does not constitute an increase in perceived household wealth under most circumstances. If, and only if, the government were more efficient than private markets in the loan process or in the

⁸ Elmendorf and Mankiw (1999): 1640-5.

production of liquidity services would government debt contribute to net wealth.⁹ Barro concluded:

*In particular in the case where the marginal net wealth effect of government bonds is close to zero, ... fiscal effects involving changes in the relative amounts of tax and debt finance for a given amount of public expenditures would have no effect on aggregate demand, interest rates, and capital formation.*¹⁰

Barro's controversial conclusions provoked other economists to conduct numerous empirical studies concerning the validity of conventional and Ricardian equivalence models during the last quarter century. Some empirical studies have tested whether individual factors (*e.g.*, income uncertainty and myopia) or external factors (*e.g.*, capital market imperfections and distortionary taxes) may erode the theoretical underpinnings of the Ricardian equivalence model.¹¹ Other empirical studies have examined whether market outcomes such as consumption expenditures and interest rates are consistent with the conventional model or the Ricardian equivalence model. The results of empirical studies on how the federal budget balance affects consumption expenditures and real interest rates are summarized below.

1. Consumption Expenditures

The conventional model differs from the Ricardian equivalence model on whether the federal budget balance affects consumption expenditures. The conventional model forecasts that a decrease (an increase) in the federal budget balance should cause a statistically significant rise (fall) in consumption expenditures. In contrast, the Ricardian equivalence model predicts that a change in the federal budget balance does not trigger a statistically significant change in consumption expenditures.

The results of empirical studies looking at consumption expenditures found mixed results. On one hand, Martin Feldstein (1982),¹² Franco Modigliani and Arlie Sterling (1986 and 1990),¹³ Martin Feldstein and Douglas W. Elmendorf (1990),¹⁴ Fred C. Graham and Daniel Himarios (1991 and 1996),¹⁵ Paul Evans (1993),¹⁶ and Fred C. Graham (1995)¹⁷ found a

⁹ Barro (1974): 1094-1117.

¹⁰ Barro (1974): 1116.

¹¹ Ricardian equivalence assumes that (1) people have infinite time horizons or (2) at least some people have altruistic motives to leave bequests to future generations.

¹² Martin Feldstein, "Government Deficits and Aggregate Demand," *Journal of Monetary Economics* 9 (1982): 1-20

¹³ Franco Modigliani and Arlie Sterling, "Government Debt, Government Spending and Private Sector Behavior: Comment," *American Economic Review* 76 (December 1986): 1168-1179; and Franco Modigliani and Arlie Sterling, "Government Debt, Government Spending and Private Sector Behavior: Further Comment," *American Economic Review* 80 (June 1990): 600-603.

¹⁴ Martin Feldstein and Douglas W. Elmendorf, "Government Debt, Government Spending, and Private Sector Behavior Revisited: Comment," *American Economic Review* 80 (June 1990): 589-599

¹⁵ Fred C. Graham and Daniel Himarios, "Fiscal Policy and Private Consumption: Instrumental Variables Tests of the "Consolidated Approach," *Journal of Money, Banking, and Credit* 23 (February 1991): 53-67; and Fred C. Graham and Daniel Himarios, "Consumption, Wealth, and Finite Horizons: Tests of Ricardian Equivalence," *Economic Inquiry* 34 (July 1996): 527-544.

¹⁶ Paul Evans, "Consumers are Not Ricardian: Evidence from Nineteen Countries," *Economic Inquiry* 31 (October 1993): 534-548.

¹⁷ Fred C. Graham, "Government Debt, Government Spending, and Private-Sector Behavior: Comment," *American Economic Review* 85 (December 1995): 1348-1356.

statistically significant negative correlation between the federal budget balance and consumption expenditures in line with the conventional model. On the other hand, Roger C. Kormendi (1983),¹⁸ David Alan Aschauer (1985),¹⁹ Roger C. Kormendi and Philip G. Meguire (1986, 1990, and 1995),²⁰ and Paul Evans (1988 and 1991)²¹ found no statistically significant relationship between the federal budget balance and consumption expenditures in line with the Ricardian equivalence model. The results of all of the empirical studies regarding consumption expenditures are summarized in Table 1.

Noting the contradictory findings of these empirical studies, Emanuela Cardia (1997) checked to see if standard consumption function tests were incapable of providing conclusive evidence about whether Ricardian equivalence is true or not.²² Applying simulated data, Cardia found:

*When the generated series are used to estimate a consumption function, the estimates on income, wealth, and government spending are very robust and remarkably close to the ones reported in the empirical literature. The estimates of the coefficients on tax revenue and government debt variables are not robust, which is also the case with the empirical literature. This suggests that the conflicting empirical evidence on Ricardian equivalence may be due to a weakness in the statistical test performed.*²³

¹⁸ Roger C. Kormendi, "Government Debt, Government Spending, and Private Sector Behavior," *American Economic Review* 73 (December 1983): 994-1010.

¹⁹ David Alan Aschauer, "Fiscal Policy and Aggregate Demand," *American Economic Review* 75 (March 1985): 117-12

²⁰ Roger C. Kormendi and Philip G. Meguire, "Government Debt, Government Spending, and Private Sector Behavior: Reply," *American Economic Review* 76 (December 1986): 1180-1187; Roger C. Kormendi and Philip G. Meguire, "Government Debt, Government Spending, and Private Sector Behavior: Reply," *American Economic Review* 80 (June 1990): 604-617; and Roger C. Kormendi and Philip G. Meguire, "Government Debt, Government Spending, and Private-Sector Behavior: Reply," *American Economic Review* 85 (December 1995): 1357-1361.

²¹ Paul Evans, "Are Consumers Ricardian? Evidence for the United States," *Journal of Political Economy* 96 (October 1988): 983-1004; and Paul Evans, "Is Ricardian Equivalence a Good Approximation?" *Economic Inquiry* 29 (October 1991): 626-644.

²² Emanuela Cardia, "Replicating Ricardian Equivalence Tests with Simulated Series," *American Economic Review* 87 (March 1997): 65-79.

²³ Cardia (1997): 76.

TABLE 1 - SUMMARY OF EMPIRICAL STUDIES ON CONSUMPTION EXPENDITURES			
ECONOMISTS	DATE OF PUBLICATION	DATA COVERAGE	RESULTS
Martin Feldstein	1982	1930-40 and 1947-77	Results contradicted Ricardian equivalence model.
Roger C. Kormendi	1983	1930-76	Consumers fully incorporated the future implications of government fiscal policy into their decisions about consumption expenditures in line with Ricardian equivalence model.
David Alan Aschauer	1985	1948-81	Results were consistent with Ricardian equivalence model.
Franco Modigliani and Arlie Sterling	1986	1952-83	Kormendi's (1983) findings were caused by errors in data measurement and model specification. U.S. consumption expenditures were consistent with the conventional model after World War II.
Roger C. Kormendi and Philip G. Meguire	1986	1931-83	Modigliani and Sterling (1986) findings were reversed if Great Depression and World War II years are included.
Paul Evans	1988	2Q 1947 – 4Q 1985	No relationship between federal budget balance and consumption expenditures in line with Ricardian equivalence model.
Martin Feldstein and Douglas W. Elmendorf	1990	1931-85	Kormendi's (1983) results were misleading because data includes World War II years. When those years are excluded, Kormendi's results were reversed. Results were consistent with the conventional model.
Franco Modigliani and Arlie Sterling	1990	1952-84	Omission of temporary tax variable, use of an inefficient model specification, and inclusion of World War II data biased results of Kormendi and Meguire (1986). Making these adjustments, consumers ignore government spending or the deficit in making their consumption decision in line with conventional model.
Roger C. Kormendi and Philip G. Meguire	1990	1931-85	Feldstein and Elmendorf (1990) failed to use published real data and to incorporate an improved model specification. The methodological errors biased their result. Making these adjustments, the results supported the Ricardian equivalence model. Inclusion or exclusion of World War II years did not affect the result.
Fred C. Graham and Daniel Himarios	1991	1948-86	Consumers treated government bonds as net wealth and did not consider government spending in their consumption choice in line with conventional model
Paul Evans	1991		Ricardian equivalence held so long as any household is forward-looking and altruistic. Ricardian equivalence held even if 25 percent of households are liquidity constrained.
Paul Evans	1993	1960-88	Results from pooled data from 19 OECD countries rejected the Ricardian equivalence model
Fred C. Graham	1995	1951-91	Kormendi made two methodological errors. When these restrictions are eliminated, the results support the conventional model.
Roger C. Kormendi and Philip G. Meguire	1995	1951-91	Graham (1995) erred in decomposing labor and capital income. After this adjustment, results were fully consistent with Ricardian equivalence model. Sensitivity test showed that Graham's results were atypical.
Fred C. Graham and Daniel Himarios	1996	1949-91	Using the market value of corporate equity rather than its book value to estimate household wealth reversed Evans' (1988) results

2. Interest Rates

The conventional model differs from the Ricardian equivalence model on whether the federal budget balance affects real interest rates. The conventional model forecasts that a decrease (an increase) in the federal budget balance should cause a statistically significant rise (fall) in real interest rates. In contrast, the Ricardian equivalence model predicts that a change in the federal budget balance should not trigger a statistically significant change in real interest rates. Unlike the mixed results of the empirical studies on consumption expenditures, the

empirical studies on interest rates have uniformly failed to find any statistically significant relationship between interest rates and the budget balance of the U.S. government.

Charles I. Plosser (1982) investigated the relationship among federal debt, federal spending, and interest rates. Applying an econometric model to data from the first quarter of 1954 to the last quarter of 1978, Plosser compared interest rates on Treasuries of various maturities to federal spending on goods and services, privately held federal net debt, and federal net debt owned by the Federal Reserve System. Plosser found no statistically significant relationship between changes in federal debt and interest rates. Contrary to the conventional model, changes in the federal budget balance did not affect interest rates. Instead, Plosser found a statistically significant correlation between federal spending and interest rates. Higher federal spending, even if funded through federal tax revenues, was linked to higher interest rates.²⁴

Under the Reagan administration, the U.S. Department of the Treasury published a comprehensive theoretical and empirical study, *The Effect of Deficits on Prices of Financial Assets: Theory and Evidence* (1984), investigating the relationship between the federal budget balance and real interest rates. Examining data on the federal budget balance and real interest rates, from the first quarter of 1965 through the second quarter of 1983, the Department of the Treasury found “high deficits have virtually no relationship with high interest rates in this time period.”²⁵

Paul Evans (1985) examined three periods of U.S. history when federal budget deficits exceeded 10 percent of GDP – the Civil War, World War I, and World War II – to ascertain whether high budget deficits increased interest rates. Contrary to the conventional model, but consistent with the Ricardian equivalence model, Evans found that federal budget deficits were negatively correlated with interest rates on commercial paper, railroad bonds, and New England municipal bonds during 1858-69. Likewise, Evans found that during 1914-20 the interest rate on railroad bonds was remarkably stable while changes in the interest rate on commercial paper were unrelated to the federal budget balance. Finally, Evans examined the World War II period. Because the Federal Reserve pegged interest rates during the war to moderate the growth of federal interest outlays, interest rates on commercial paper and the Moody’s Aaa corporate bond index were not surprisingly stable. Wartime rationing prevented any rise in consumption. To test whether in the absence of such controls consumption and interest rates would have risen as predicted by the conventional model or would have remained stable as predicted by the Ricardian equivalence model, Evans used a proxy to predict what consumption expenditures would have been without controls. He found that desired consumption expenditures actually fell as federal budget deficits rose during World War II.²⁶

While previous studies had examined whether past or current federal budget balances affect current interest rates, Paul Evans (1987) examined whether expectations of future federal

²⁴ Charles I. Plosser, “Government Financing Decisions and Asset Returns,” *Journal of Monetary Economics* 9 (1982): 325-352.

²⁵ The Honorable Manuel H. Johnson, Assistant Secretary of the Treasury for Economic Policy, “Introduction,” in U.S. Department of the Treasury, The Office for the Assistant Secretary for Economic Policy, *The Effect of Deficits on Prices of Financial Assets: Theory and Evidence* (Washington, D.C.: Government Printing Office, March 1984), no page number.

²⁶ Paul Evans, “Do Large Deficits Produce High Interest Rates?” *American Economic Review* 75 (March 1985): 68-87.

budget balances affected current interest rates. Evans compared the commercial paper rate, the Moody's Aaa corporate bond index rate, and the *ex post* real commercial paper rate to current and past federal spending, federal budget balances, and real money supply data from June 1908 to 1984. Evans found that interest rates are not related to past, present, or expected federal budget balances. Evans also examined whether anticipated tax cuts or hikes had any impact on interest rates. He found that interest rates were neither bid up in 12 months leading to each major tax reduction nor bid down in the 12 months leading to each major tax increase during June 1908 through 1984. These findings are consistent with the Ricardian equivalence model.²⁷

Building upon his 1982 study, Charles I. Plosser (1987) expanded the data set to 1985 and examined the relationship between expected future federal budget balances and interest rates. Overall, Plosser's results confirmed his earlier findings. Plosser again failed to find a statistically significant relationship between federal budget balance and nominal or real interest rates. Expected future federal budget deficits did not raise interest rates.²⁸

E. Implications of Findings

A review of relevant empirical studies yields mixed results on the effect of the federal budget balance on consumption expenditures. Some economists found a statistically significant negative correlation between the federal budget balance and consumption; *i.e.*, reducing federal surpluses or increasing federal deficits will cause consumption expenditures to rise. Others found no statistically significant relationship between the federal budget balance and consumption expenditures. Apparently, consumption expenditure studies are very sensitive to the data selection and model specification. Consequently, the empirical evidence regarding consumption expenditures fails to provide robust support for the conventional model.

In contrast, none of the empirical studies found a statistically significant relationship between the federal fiscal position and real interest rates. These consistent findings across many data sets and model specifications do not statistically support the conventional model's hypothesis that an increase (decrease) in the federal budget balance will cause real interest rates to fall (rise). Thus, the Ricardian equivalence model's hypothesis that such a change in the federal budget balance will not affect real interest rates cannot be rejected.

Any change in the federal net debt due to the federal budget balance should be compared to overall size of global financial markets from which net debt is funded. On December 31, 2000, the value of securities outstanding in global financial markets was \$60 trillion. That means a \$150 billion surplus (deficit) represents about 0.25 percent of global financial markets. Even compared to smaller domestic financial markets of \$30 trillion, a federal budget surplus (deficit) of \$150 billion is still a mere 0.50 percent of domestic financial markets. From this perspective, the conclusion that the federal fiscal position does not measurably affect real interest rates significantly appears reasonable.²⁹

To the extent that the federal budget balance does not measurably affect real interest rates, then the federal budget balance cannot measurably affect domestic investment, net

²⁷ Paul Evans, "Interest Rates and Expected Future Budget Deficits in the United States," *Journal of Political Economy* 95 (February 1987): 34-58.

²⁸ Charles I. Plosser, "Fiscal Policy and Term Structure," *Journal of Monetary Economics* 20 (1987): 343-367.

²⁹ Derived from data from *Size and Structure of World Bond Market* (New York: Merrill Lynch, 2001) and Ibbotson Associates.

international investment, or real GDP growth over time. The conventional model postulates that a negative movement in the federal budget balance will increase real interest rates, this increase will cause domestic investment and net international investment to decline, and such declines will slow capital accumulation and decelerate long-term real GDP growth. However, empirical studies generally found no statistically significant relationship between the federal budget balance and real interest rates. The real interest rate transmission mechanism from the federal fiscal position through domestic investment and net international investment to real GDP growth claimed by the conventional model does not appear to exist at least over the range of federal net debt to GDP ratios that have occurred in U.S. history. While there might be a relationship between federal net debt and real interest rates at very high federal net debt to GDP ratios (120 percent or more), data limitations make such a relationship impossible to determine. Over any range relevant to U.S. policymakers, however, a change in federal budget balance or net debt is unlikely to affect real GDP growth in a statistically significant way.

With the federal net debt to GDP ratio of 32.0 percent as of July 31, 2001, the macroeconomic benefits from a moderate reduction of federal net debt are not empirically measurable. Empirical evidence suggests that a moderate reduction of federal net debt would not produce any significant real GDP growth dividend for the American economy. Under current circumstances, the macroeconomic opportunity cost for foregoing a moderate reduction of federal net debt is, if not zero, quite small.

IV. How Do Additional Federal Tax Reductions Affect Real GDP Growth?

The burden of federal taxation upon the U.S. economy is significantly greater than the amount of federal tax revenues collected each year from individual and firm taxpayers. Because of administrative costs, compliance costs, and deadweight losses, the economic burden of paying a dollar in taxes to the U.S. government is significantly greater than one dollar.

A. Administrative Costs

The administrative costs are the expenses that U.S. government incurs in devising, administering, and enforcing federal tax laws. These include the costs of Congress drafting federal tax legislation and providing oversight of the Internal Revenue Service (IRS), the administrative, information management, auditing, and enforcement activities of the IRS, and the tax-related supervisory activities of the President and the Secretary of the Treasury. Because Congress must appropriate sufficient funds for these activities, U.S. taxpayers bear the burden of the administrative expenses of the federal tax system indirectly through higher federal taxes or lower federal spending on other activities or programs. During fiscal year 2000, the IRS will spend \$8.6 billion and will employ approximately 97,000 workers to administer federal tax laws. That amounts to 0.4 percent per dollar of all federal tax collections or 0.7 percent of federal income tax collections.³⁰

B. Compliance Costs

Closely related to administrative costs are compliance costs. The IRS expects that individuals and business firms will file approximately 215 million returns during 2001.³¹ Both

³⁰ Executive Office of the President, Office of Management and Budget. *Budget of the United States, Fiscal Year 2002, Appendix*, vol. 2. Washington, D.C.: Government Printing Office, 2001: 2-861.

³¹ *Budget Fiscal Year 2001: Appendix*: 2-861

individual and business taxpayers must bear the burden of filing these returns and complying with federal law directly. Compliance costs includes the value of the time and out-of-pocket costs of learning tax requirements, record keeping, tax preparation, accounting, legal, and other professional fees, and responding to audits and enforcement proceedings. Surveying and synthesizing the empirical research on compliance cost, Joel Slemrod and Jon Bakija (2000) estimated the compliance cost of the federal income tax was about \$100 billion or 10 percent of federal income tax revenue raised in 1999.³²

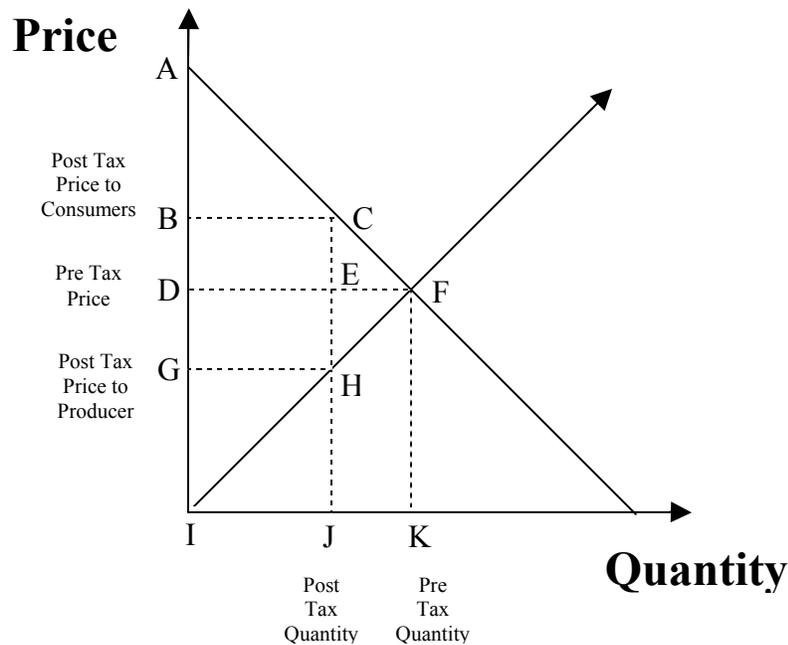
C. Deadweight Losses

Economic activity depends upon voluntary exchange among individuals and firms. Taxation is a burden that discourages individuals and firms from undertaking economic activities that they would otherwise undertake in the absence of such taxation. Taxes create disincentives toward economically productive behavior such as work, savings, or investment. Thus, taxation alters the economic behavior of individuals and firms in ways that reduce overall economic welfare. This reduction is known as the deadweight losses from taxation.

Deadweight losses from taxation may be depicted graphically (see Graph 1). The triangle to the left of the intersection point of the demand and supply curves may be divided into two triangles, AFD and DFI, by the horizontal line indicating the market-clearing price. The upper triangle, AFD, represents consumer surplus (*i.e.*, the cumulative value that consumers place on a good in excess of its market-clearing price), and the lower triangle, DFI, represents producer surplus (*i.e.*, the economic profits to producers for selling units at the market-clearing price). Any tax may be thought of as a wedge between consumers and producers that simultaneously raises the price paid by consumers from D to B and lowers the price received by producers from D to G. Because of this tax wedge, the number of units produced and sold will decline from K to J.

The difference between the price paid by consumers, B, and the price received by producers, G, multiplied by the quantity of units sold after the tax is imposed, J, is the rectangle BCHG, which represents the tax revenue to the government. However, because any new tax reduces the number of units that would have otherwise been produced and sold, some of both the consumer surplus and producer surplus that would have existed without the tax is not transferred to the government, but instead is lost to the economy forever. This is the deadweight loss from taxation. Graphically, the triangle CFH, which is composed of the portions of the pre-tax consumer and producer surplus triangles to the right of the vertical line depicting the number of units produced and sold after the new tax is imposed, represents the deadweight losses from taxation.

³² Joel Slemrod and Jon Bakija, *Taxing Ourselves: A Citizen's Guide to the Great Debate over Tax Reform* (Cambridge, Massachusetts: The MIT Press, 2000): 137.

Graph 1 – Deadweight Losses

Pre-Tax Consumer Surplus = ΔADF

Pre-Tax Producer Surplus = ΔDFI

Post Tax Consumer Surplus = ΔABC

Post Tax Producer Surplus = ΔGHI

Tax Revenue = $\square BCHG$

Deadweight Losses = ΔCFH

While all economists have long accepted the deadweight losses from taxation conceptually, there has been relatively little empirical work until recent years to quantify the size of the deadweight losses from taxation in the United States. Early studies using partial equilibrium models found that deadweight losses were relatively small. Using 1974 data, Edgar K. Browning (1976) found that the marginal excess burden of additional taxes on labor income was between 8.3 percent and 15.6 percent of revenue raised, depending what taxes were increased.³³ In a second partial equilibrium study, Browning (1987) found the marginal excess burden of taxation varied from under 10 percent to more than 300 percent of marginal tax revenue.³⁴

Taking a different methodological approach, Charles Stuart (1984) applied a general equilibrium model to 1976 data. Stuart found the marginal excess burden of the U.S. tax system was 20.7 percent based upon the marginal tax rates that prevailed in 1976. Stuart found the

³³ Edgar K. Browning, "The Marginal Cost of Public Fund," *Journal of Political Economy* 84 (April 1976): 283.

³⁴ Edgar K. Browning, "On the Marginal Welfare Cost of Taxation," *American Economic Review* 77 (March 1987): 11.

marginal excess burden was 24.4 percent based upon the marginal tax rates that prevailed in 1979.³⁵

Charles L. Ballard, John B. Shoven, and John Whalley (1985) calculated the marginal excess burden for all major taxes in the United States. Using a general equilibrium model with mid-range estimates for uncompensated labor supply elasticity of 0.15 and for uncompensated savings elasticity of 0.4, Ballard, Shoven and Whalley found the average marginal excess burden from U.S. taxation was 33.2 percent (see Table 2).

All Taxes	33.2 %
Capital taxes at Industry Level including Corporate Income and Property Taxes	46.3 %
Labor Taxes at Industry Level including Payroll Taxes	23.0 %
Consumer Sales Taxes including Alcoholic Beverages, Tobacco Products, and Motor Vehicle Fuels	38.8 %
Consumer Sales Taxes excluding Alcoholic Beverages, Tobacco Products, and Motor Vehicle Fuels	11.5 %
Personal Income Taxes	31.4 %
Output Taxes including Excise Taxes and Other Indirect Business Taxes	27.9 %

Other empirical research has found even higher values for the marginal excess burden for the federal taxation. Martin Feldstein (1995) asserted that the traditional method for calculating deadweight losses solely based upon the substitution of leisure for labor (*i.e.*, the elasticity of labor supply) seriously underestimated the actual deadweight losses from taxation. Taxpayers can use exemptions and deductions to avoid tax increases. For example, individuals may substitute tax-exempt health insurance benefits for taxable wages. Individuals may also reduce their tax burden by shifting toward tax-preferred forms of consumption such as owner-occupied housing.³⁷ Yet, the traditional method ignored these important behavioral responses to tax changes. To capture these behavioral responses, Feldstein used the compensated elasticity of taxable income instead of the compensated elasticity of labor supply in calculating deadweight losses. Applying this methodology in the National Bureau of Economic Research's TAXSIM model to 1994 data, Feldstein found:

The deadweight loss of \$181 billion [for the federal individual income tax] represents 32.2 percent of the TAXSIM estimate of \$543 billion personal income tax revenue for 1994. ... The TAXSIM estimate ignores the effect of Social Security payroll taxes on the deadweight loss of the income tax. An alternative calculation [including the Social Security payroll tax] ... implies a

³⁵ Charles Stuart, "Welfare Costs per Dollar of Additional Tax Revenue in the United States," *American Economic Review* (June 1984): 358.

³⁶ Charles L. Ballard, John B. Shoven, and John Whalley, "General Equilibrium Computations of the Marginal Welfare Costs of Taxes in the United States," *American Economic Review* 75 (March 1985): 136.

³⁷ Homebuyers receive a federal income tax deduction for mortgage interest payments. A federal income tax increase may cause some individuals to shift from renting to owning a home to take advantage of this deduction.

*substantially larger deadweight loss of \$284 billion or 52 percent of the personal income tax revenue.*³⁸

Reviewing the empirical literature regarding deadweight losses from taxation, Richard K. Vedder and Lowell E. Gallaway (1999) concluded:

*To be sure there are still higher estimates ... as well as lower ones, but the 40-cent estimate is probably approximately a midpoint estimate of the many serious studies performed. It is important to note all the studies show some deadweight loss from taxation ... the 40-cent welfare loss per tax dollar estimate is a reasonable midrange evaluation of studies of the issues using different methodologies, data sets, and time periods.*³⁹

D. Real GDP Growth Benefits from Additional Federal Tax Reductions

Marginal tax rate cuts stimulate two behavioral responses among individuals. One response is known as the “substitution effect”; the other, the “income effect.” Reducing marginal tax rates is analogous to cutting prices of taxable activities such as work, saving, and investment relative to nontaxable activities such as leisure. On one hand, a tax cut may cause individuals to undertake more of the now relatively lower cost taxable activities and less of the now relatively higher cost nontaxable activities. This is the substitution effect. On the other hand, a tax cut may make individuals feel wealthier causing them to engage in less of the taxable activities. This is the income effect. Economists cannot determine *a priori* whether the substitution effect or the income effect will predominate at the individual level.

With regard to effect of after-tax wages on labor supply, the substitution effect may occur either at the intensive margin (hours worked among the currently employed) or at the extensive margin (labor force participation). Among all subgroups, prime working age married men have consistently shown a low elasticity regarding hours worked and a slightly greater elasticity regarding participation. Prime working age married women as well as older individuals display significantly higher elasticities regarding both hours worked and participation. The labor supply of these groups is more responsive to tax changes than the labor supply prime working age married men.⁴⁰ With regard to effect of the after-tax return on the savings, the supply of savings is more elastic to changes in marginal tax rates than the supply of labor.

Marginal income tax rate cuts reduce the deadweight losses attributable to taxation. As marginal tax rates decline, the wedge between pre-tax income and post-tax income for economically productive activities shrinks. For example, a marginal income tax rate reduction increases the take-home pay of employees and the after-tax return of buying a Treasury bond. This shrinkage of the tax wedge encourages economically productive activities, decreases the deadweight losses from taxation, and thereby enhances overall economic welfare.

International comparisons demonstrate the negative correlation between taxation and economic growth in developed countries. In an Organization for Economic Cooperation and

³⁸ Martin Feldstein, *Tax Avoidance and the Deadweight Loss of the Income Tax*, NBER Working Paper 5055, (Cambridge, Massachusetts: National Bureau of Economic Research, March 1995): 32.

³⁹ Richard K. Vedder and Lowell E. Gallaway, *Tax Reduction and Economic Welfare*, Prepared for the Joint Economic Committee, 106th Congress, 1st Session, April 1999: 6.

⁴⁰ Harvey Rosen, *Public Finance* 6th Ed. (Boston: McGraw-Hill Irwin, 2002): 374-378.

Development (OECD) report, Willi Leibfritz, John Thornton and Alexandra Bibbee (1997) found:

Our estimates, based on a highly simplified “top-down” approach (i.e., cross-country regression analysis), suggest that the increase in the average (weighted) tax rate of about 10 percentage points over the past 35 years may have reduced OECD annual growth rates by about ½ percentage point. ... The “top-down” has several shortcomings as a reliable basis for the assessment of tax effects on the economy. The analysis in the paper suggests that it is necessary to supplement it with a “bottom-up” approach which examines the various channels through which taxation affects economic growth, in particular via to distortions to saving, physical and human capital formation, and labour supply. ... While the results are model-dependent, one of the endogenous growth models finds that a cut in the tax-to-GDP ratio by 10 percentage points of GDP (accompanied by a deficit-neutral cut in transfers) may increase annual growth by ½ to 1-percentage points.⁴¹

In a World Bank staff working paper, Keith Marsden (1983) examined the economic performance of 20 countries, pairing one high-tax country with one low-tax country with similar initial *per capita* GDP, during 1970-79.⁴² Marsden observed the average (unweighted) annual rate of real GDP growth was 7.3 percent in the low-tax group and 1.1 percent in the high-tax group.⁴³ Performing a statistical analysis relating the tax/GDP ratio to real GDP growth, Marsden found:

An increase of one percentage point in the tax/GDP ratio decreases the rate of economic growth by 0.36 percent points. ... The results suggest that taxes affect growth in two ways: first, by influencing the aggregate supply of the main factors of production by raising or lowering their net (after tax) returns and second, by influencing the efficiency of resource utilization (total factor productivity).⁴⁴

Marsden also observed “[g]ross domestic investment grew at substantially higher rates in low-tax countries, averaging 8.9 percent annually, compared with an annual decline of 0.8 percent in high-tax countries.” Performing a statistical analysis relating the tax/GDP ratio to investment, Marsden found “an increase in the total tax ratio of 1 percentage point lowers the rate of growth of investment by 0.66 percentage points.”⁴⁵ Finally, Marsden observed “[n]onagricultural employment rose more rapidly in low-tax countries. So did productivity (GDP per member of the labor force), by 5.0 percent a year on the average compared with a decline of 0.1 percent in high-tax countries.”⁴⁶

⁴¹ Willi Leibfritz, John Thornton, and Alexandra Bibbee, *Taxation and Economic Performance* (Paris: Organization for Economic Cooperation and Development, 1997): 10-11.

⁴² Keith Marsden, *Links between Taxes and Economic Growth: Some Empirical Evidence*, World Bank Staff Working Paper 605 (Washington, D.C.: World Bank, 1983).

⁴³ Marsden: 2.

⁴⁴ Marsden: 8, 11.

⁴⁵ Marsden: 12.

⁴⁶ Marsden: 20-21.

E. Implications of Findings

In terms of economic welfare, the macroeconomic opportunity cost of foregoing additional federal tax reductions is quite high. Though the marginal excess burdens imposed by different elements of federal taxation may vary, a mid-range estimate of the aggregate marginal excess burden of federal taxation is 40 cents per dollar of federal revenue. Thus, federal taxation imposes extraordinary deadweight losses upon the U.S. economy. Moreover, empirical studies suggest that lower federal taxes, especially marginal income tax rates, will significantly accelerate long-term real GDP growth. Thus, empirical evidence suggests that, under current circumstances, the macroeconomic opportunity cost of foregoing moderate federal tax relief is higher than the macroeconomic opportunity cost of foregoing a moderate reduction of federal net debt.

V. Conclusion

Prior to the events of September 11, 2001, the U.S. government expected to run large recurring budget surpluses during the next decade. The terror attacks have substantially changed the fiscal outlook.

With bipartisan congressional support, President George W. Bush has launched a war on terrorism that will increase defense outlays. The federal government will make substantial one-time outlays for disaster relief and recovery assistance in fiscal year 2002. Economic dislocations associated with these attacks may aggravate the U.S. economic slowdown. In this new economic and security environment, a bipartisan consensus has emerged that reducing federal net debt as rapidly as possible is not the exclusive objective of fiscal policy. Instead, both the Bush administration and Congress agree that additional tax reductions are needed to stimulate economic growth. The available empirical evidence indicates that this is the appropriate fiscal policy response under current circumstances and given the range of feasible policy options. This study does draw conclusions about the appropriate fiscal policy under substantially different circumstances.

Empirical studies consistently find that additional federal tax reductions, particularly of marginal federal income tax rates, would generate large macroeconomic benefits. The marginal excess burden from federal taxation is about 40 percent. Reducing such deadweight losses through additional federal tax relief would enhance overall economic welfare and stimulate long-term real GDP growth.

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